



**Graham R. Jeffries**

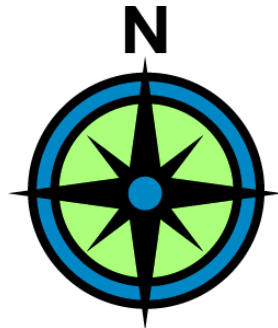
**NEARC 2012**

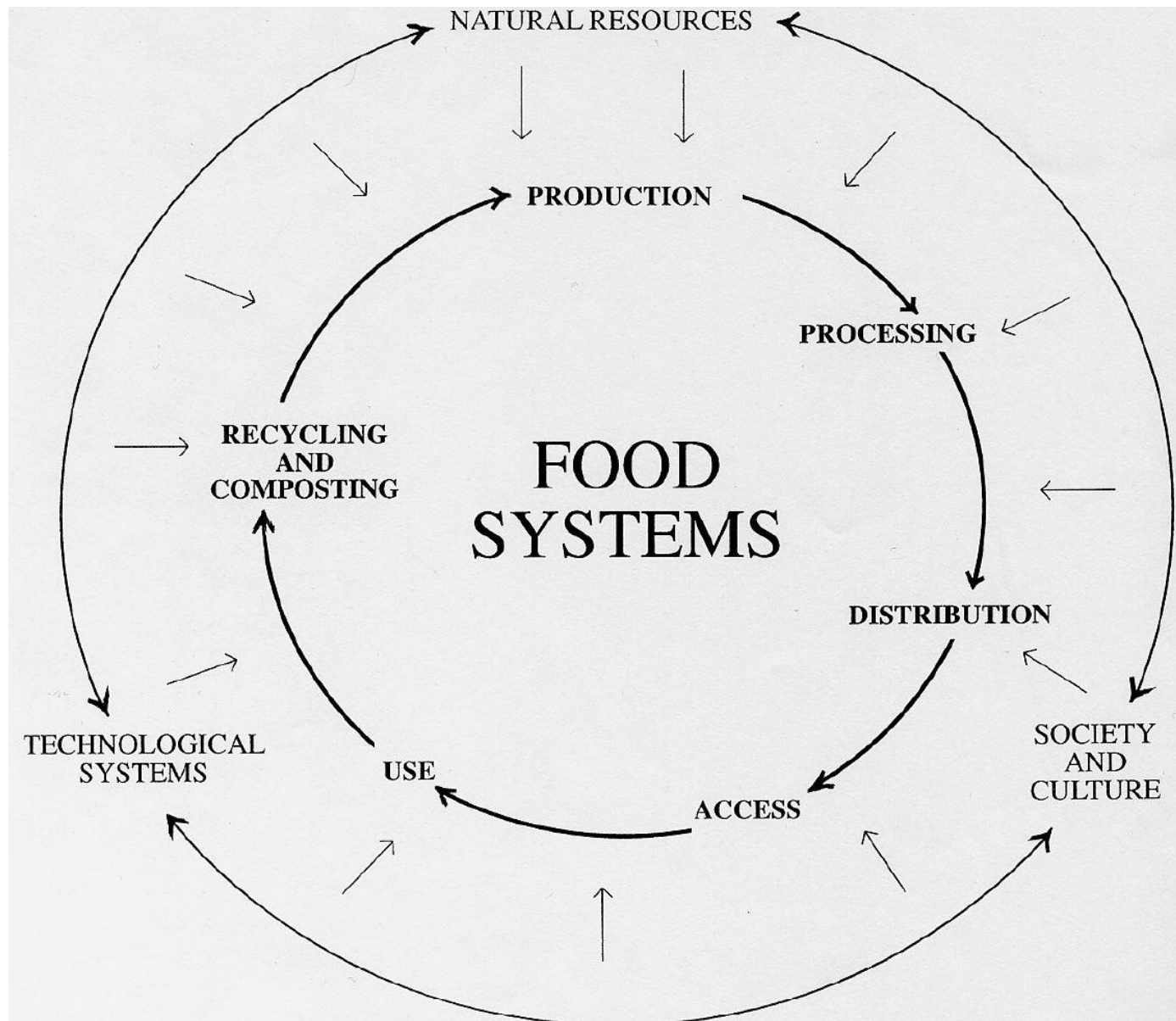
**5 | 22 | 12**

**Comparative Foodshed  
Analysis of Potential  
Local-Regional Food  
Production Across the U.S.**

**Tufts**  
UNIVERSITY

Gerald J. and Dorothy R.  
Friedman School of Nutrition  
Science and Policy

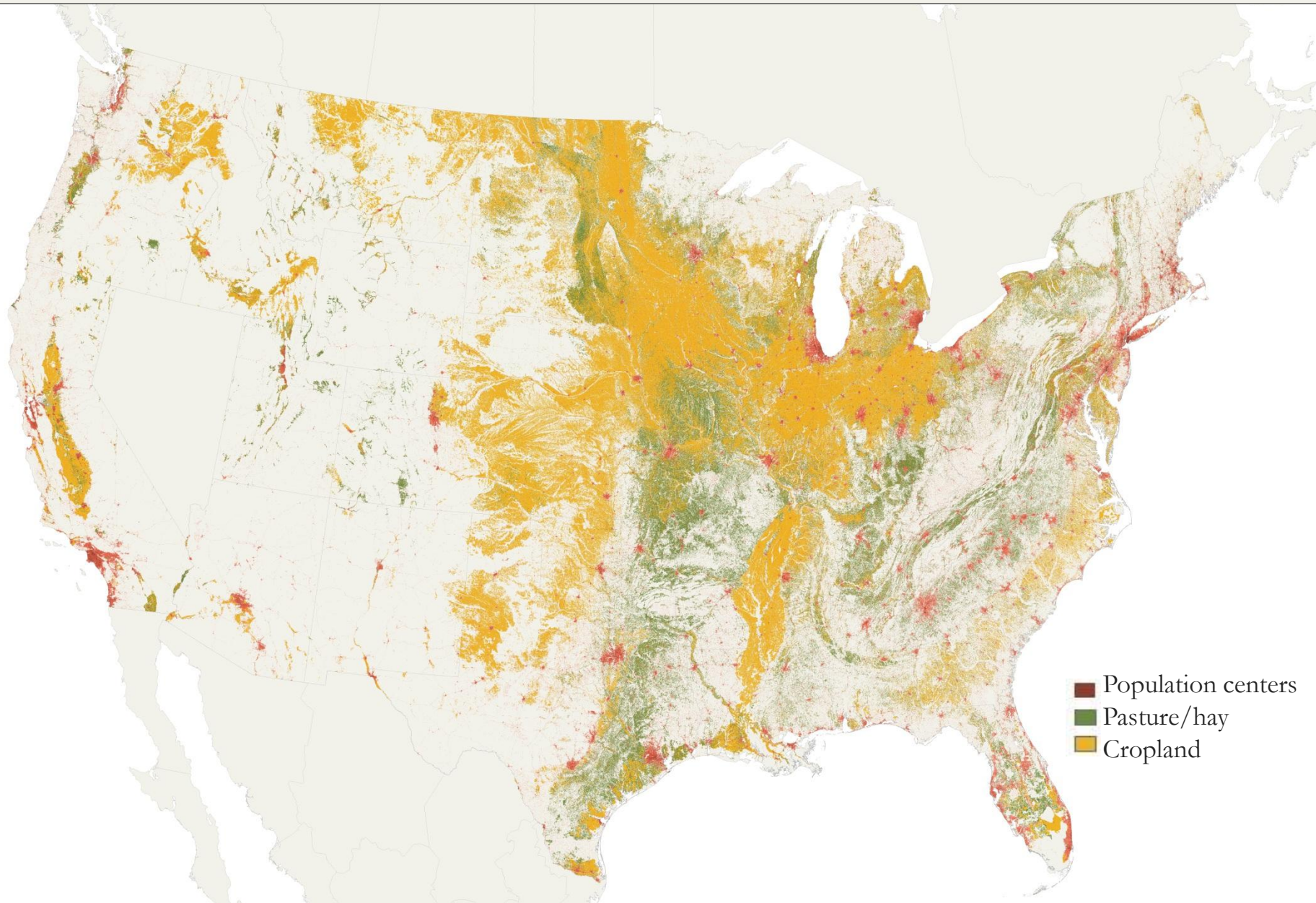




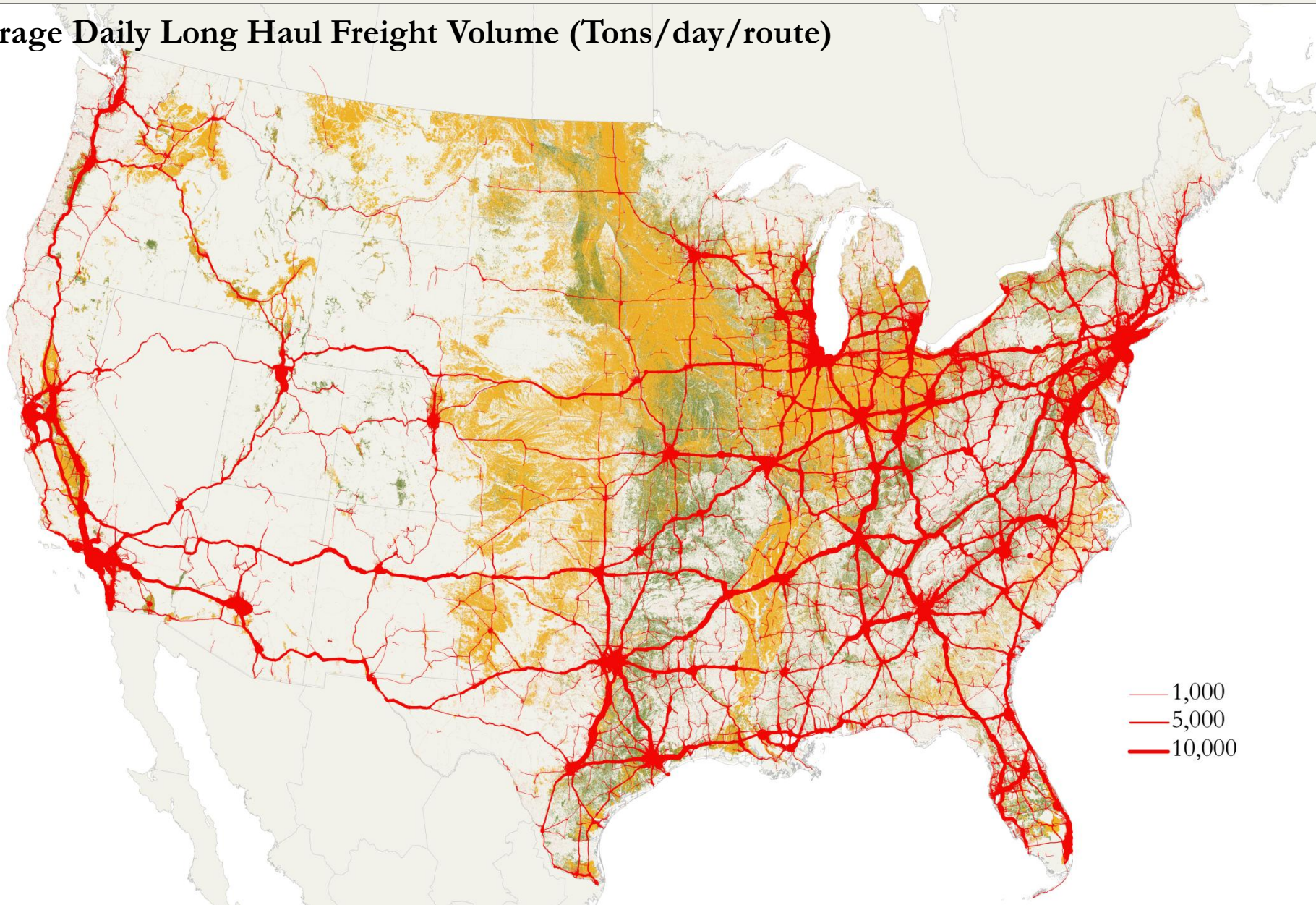
Sources:

Dahburg (1995). <http://homepages.wmich.edu/~dahlberg/F14.pdf>



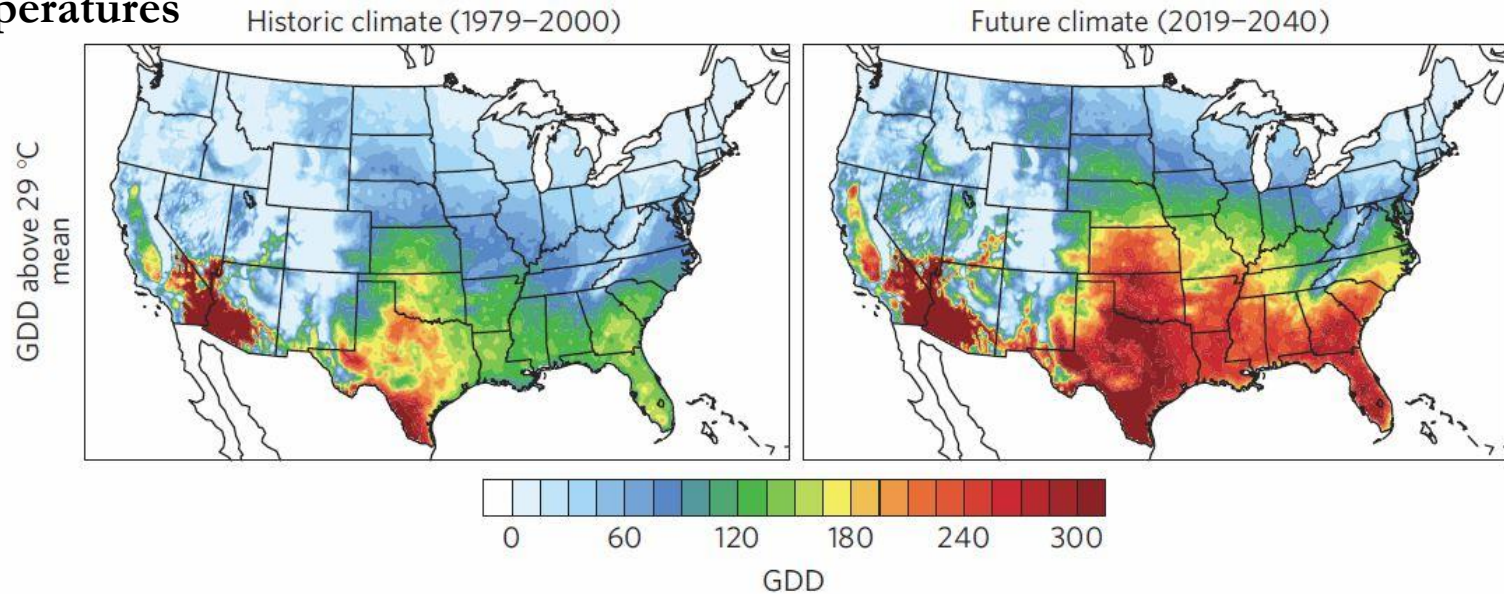




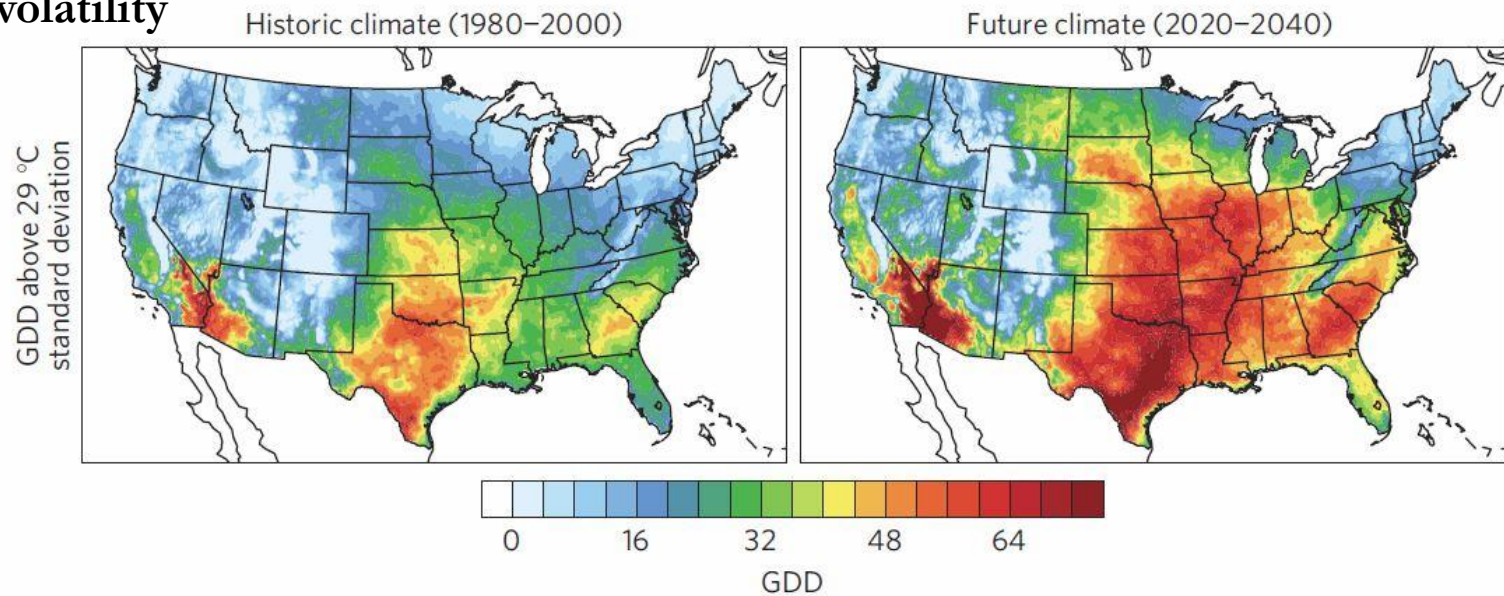
**Average Daily Long Haul Freight Volume (Tons/day/route)**



## Rising temperatures



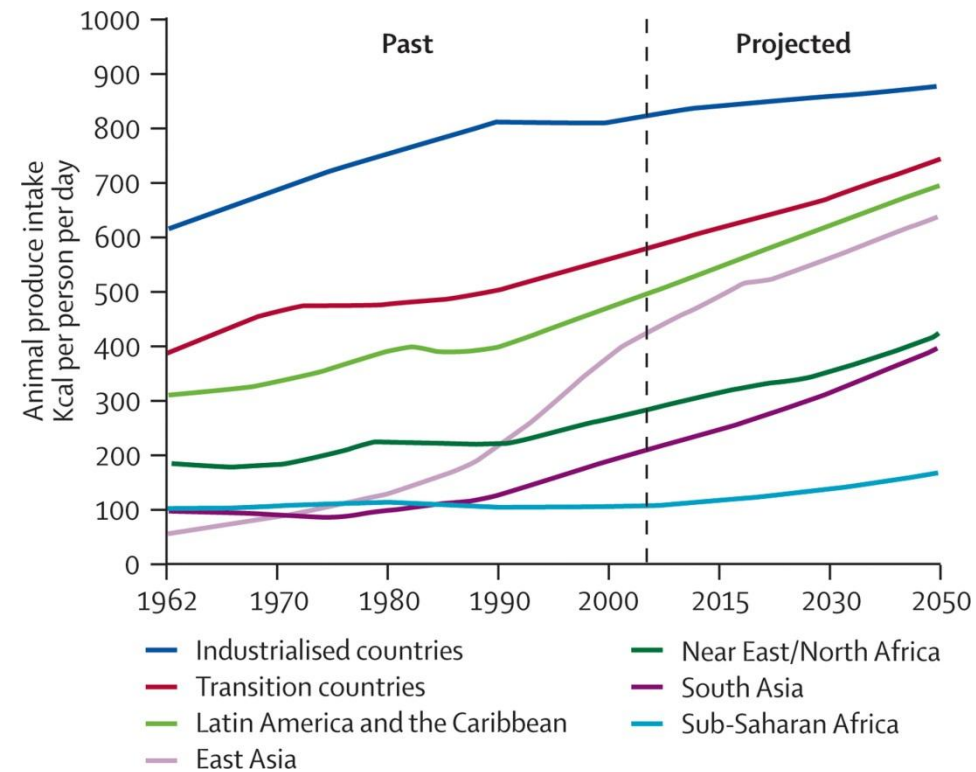
## With more volatility



## Animal products are resource intensive and increased demand is expected

*Grain and Forage Inputs per Kilogram of Animal Product Produced, and Fossil Energy Inputs (kcal) Required to Produce, 1 kcal of Animal Protein*

Livestock	Grain (kg) <sup>a</sup>	Forage (kg) <sup>b,c</sup>	kcal input/kcal protein
Lamb	21	30	57:1
Beef cattle	13	30	40:1
Eggs	11	—	39:1
Beef cattle	—	200	20:1
Swine	5.9	—	14:1
Dairy (milk)	0.7	1	14:1
Turkeys	3.8	—	10:1
Broilers	2.3	—	4:1



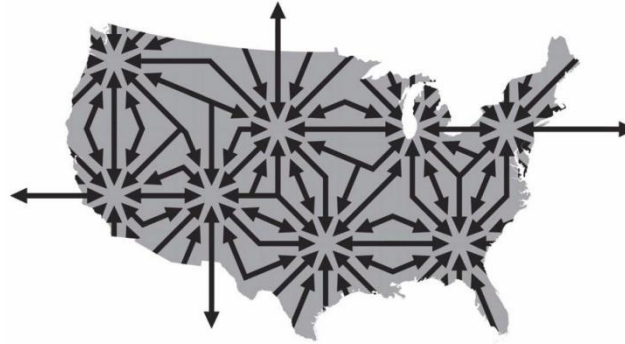
**Production**

Data inputs:

- Land cover/land use
- Ag. yield statistics
- Modeled crop growth
- Meteorology data
- Soil geochemistry

Scenarios:

- Increasing temperature and precipitation variation
- Land cover change

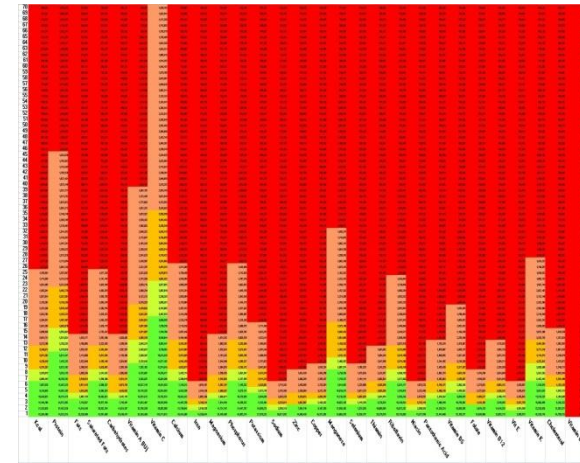
**Distribution**

Data inputs:

- Road, rail, water pathways
- Wholesale market prices
- Supply chain locations
- Transport energy use, capacity, and emissions

Scenarios:

- Geographic constraints
- Changing diesel prices

**Diet and consumption**

Data inputs:

- Population counts
- Dietary preferences
- Complete diet model

Scenarios:

- RDA's met
- More meat and fats



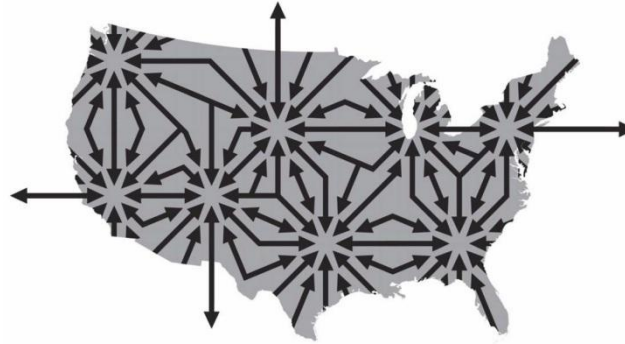
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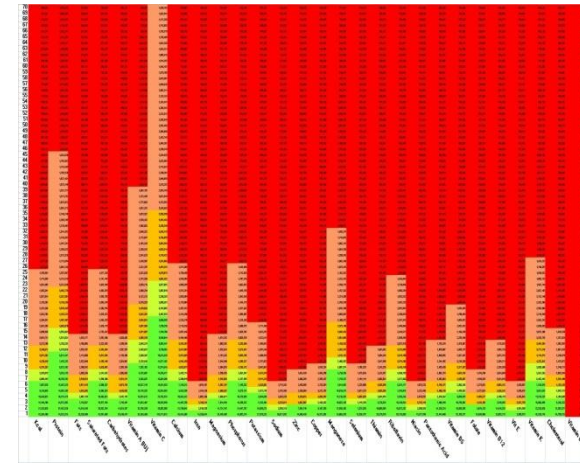
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## Scenarios:

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**Diet and consumption**

## Data inputs:

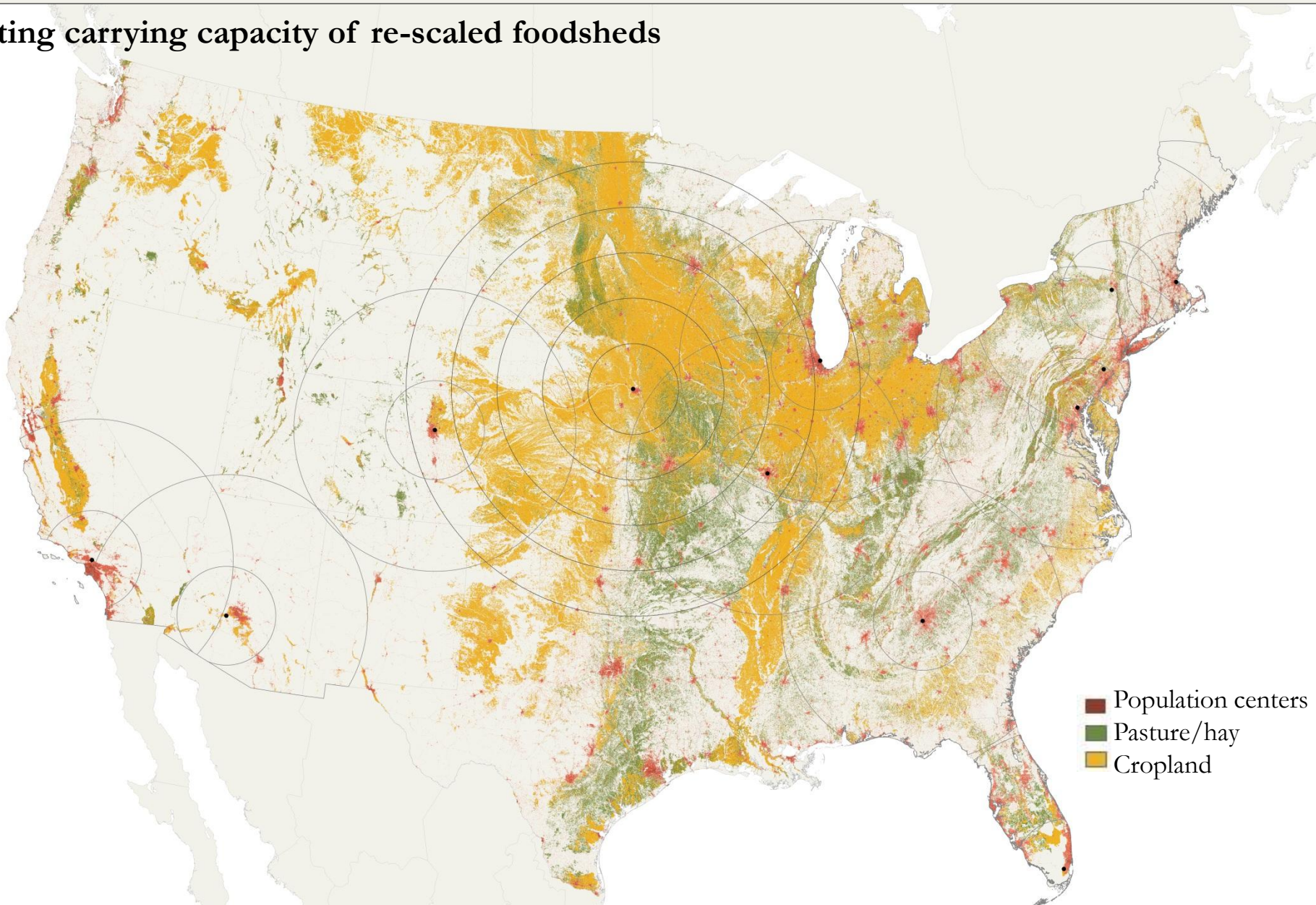
- Population counts
- Dietary preferences
- Complete diet model

## Scenarios:

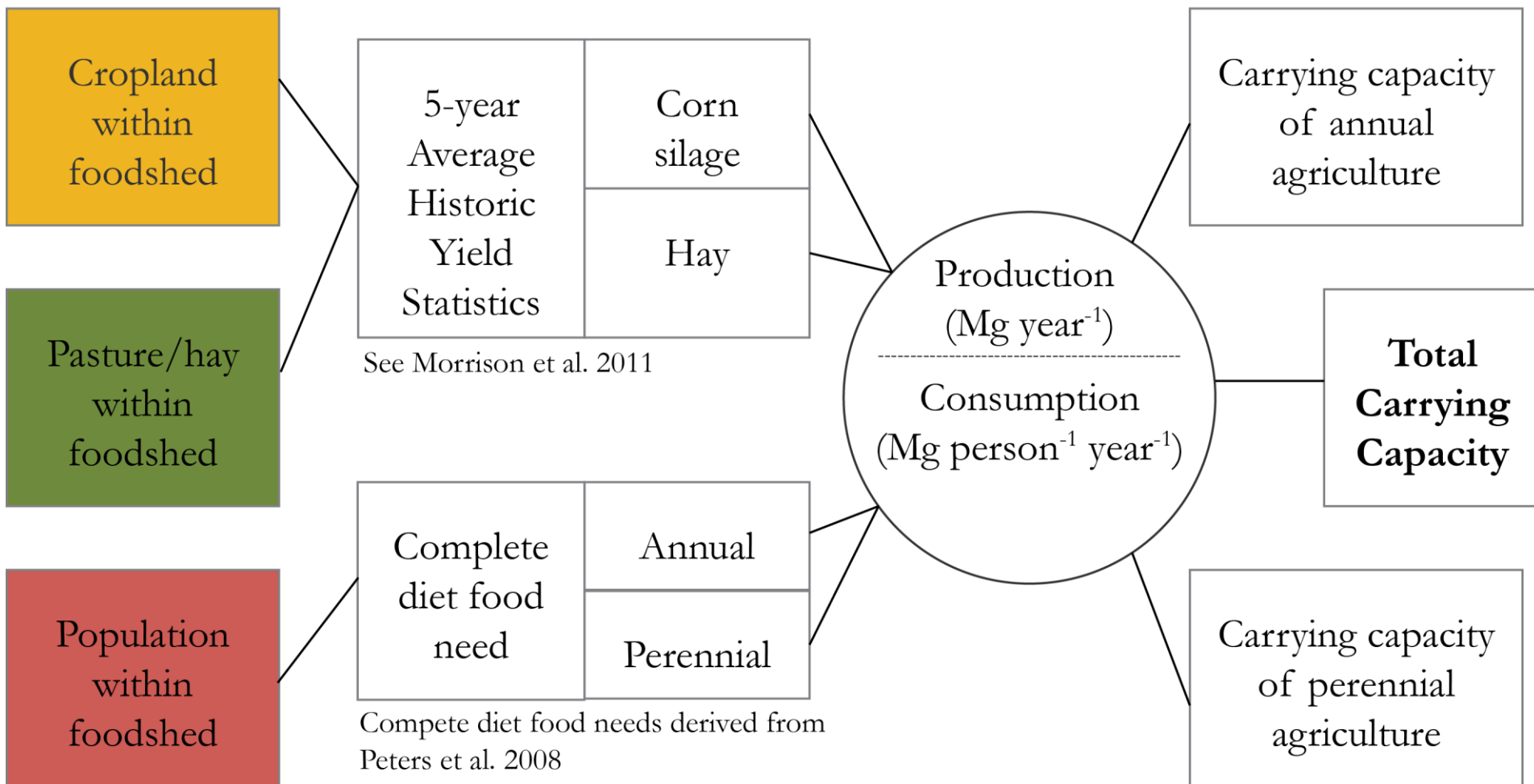
- RDA's met
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# Testing carrying capacity of re-scaled foodsheds



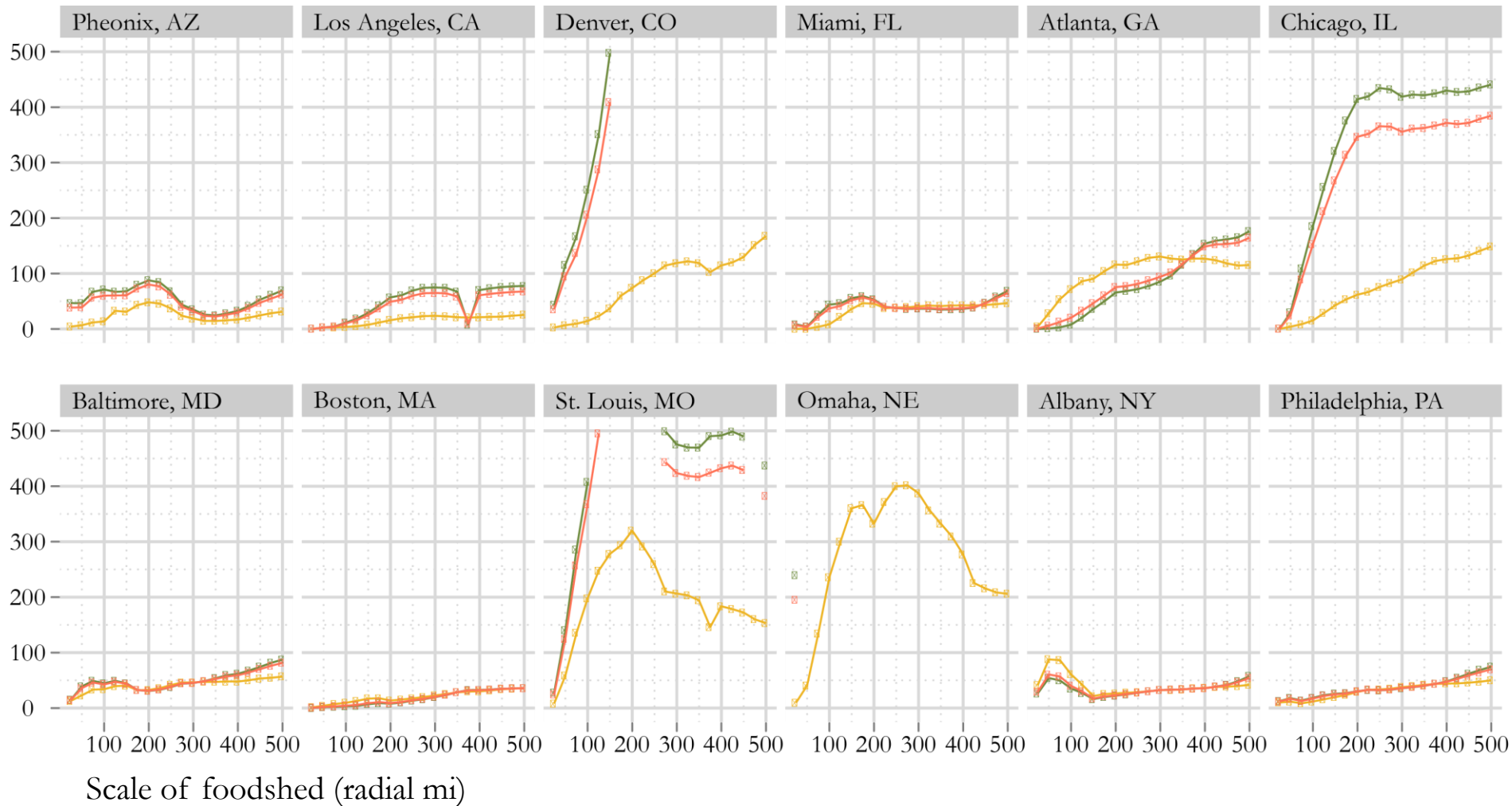
**For each unique foodshed:**

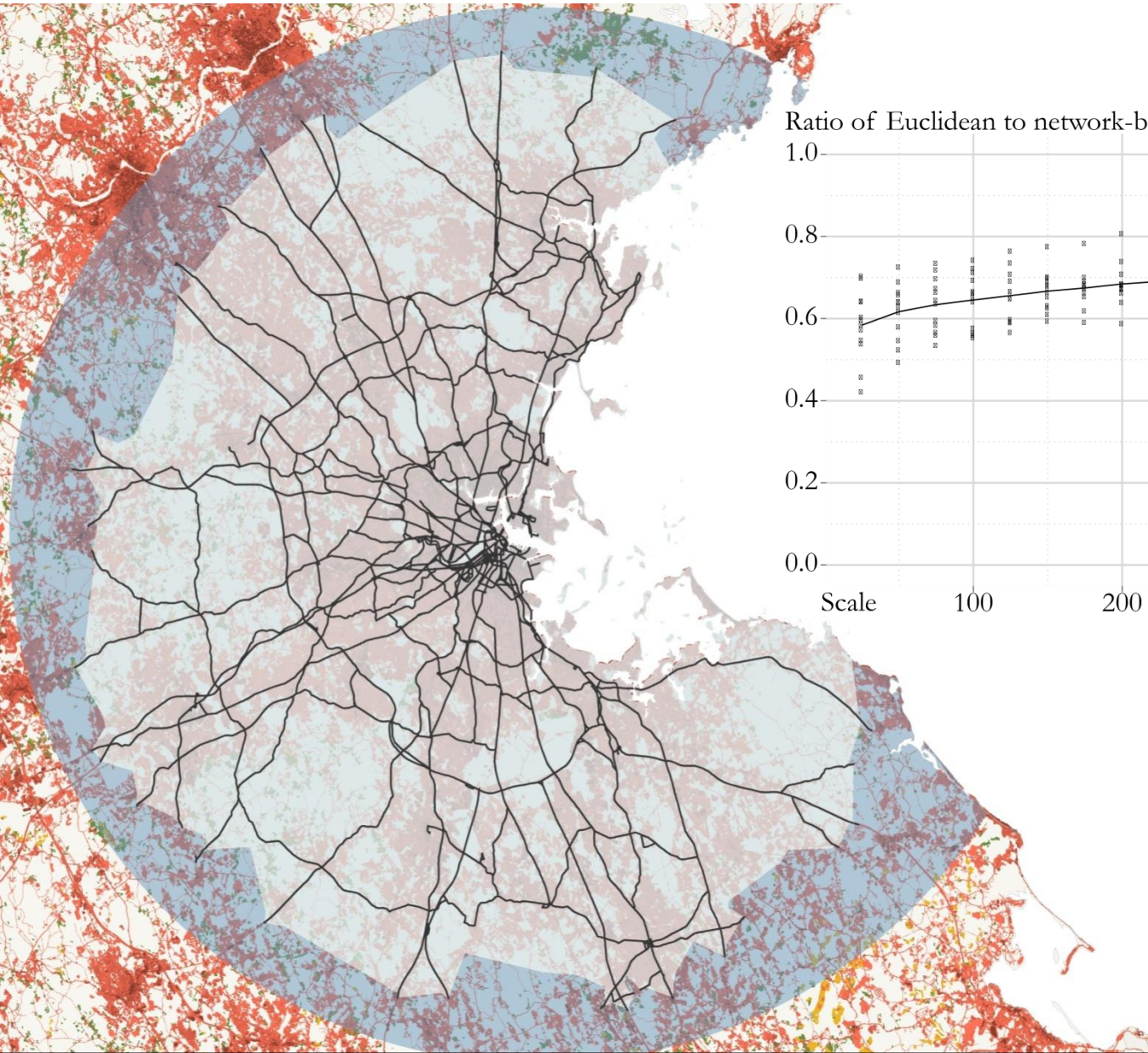




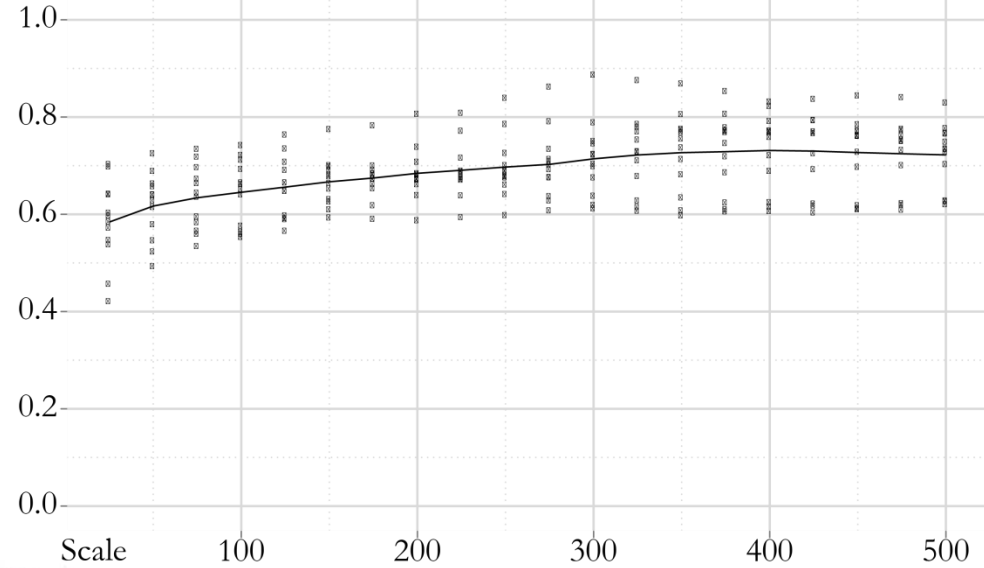
- Weighted Average
- Perennial Ag. Foods
- Annual Ag. Foods

Carrying capacity (% of population food needs met)

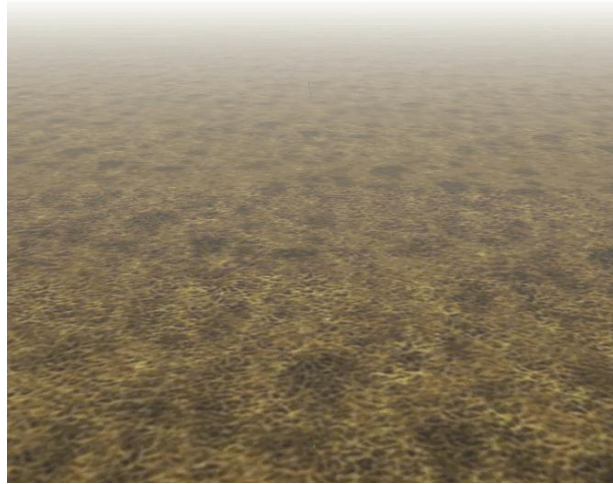




Ratio of Euclidean to network-based foodshed areas







- Crop growth simulation
- High-res climate modeling
- GIS on the Tufts Research Cluster



- Supply chain clustering
- I/O modeling with graph databases

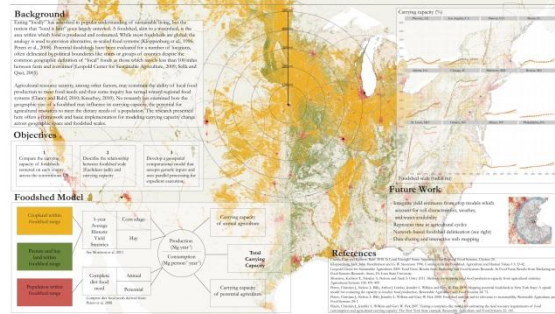
PENNSTATE



## Inform public discourse

### Comparative Foodshed Analysis of Potential Local-Regional Food Production across the US

Graham R. Jefferies | Agriculture, Food, and Environment Program | Spring 2012



### Target:

- Broad audience
- Pragmatic

### Medium:

- Infographics
- Animated maps
- Mini documentaries
- Interactive web content

## Advance sustainable food initiatives



### Target:

- Entrepreneurs
- Non-profits

### Medium:

- Feasibility studies
- Custom research
- Vehicle routing optimization

## Support policy change



### Target:

- Policy makers
- Research institutes
- Advocacy groups

### Medium:

- Policy assessment
- LCA analysis
- Economic impact assessment



